Marine and Coastal Resource Department
TOWN OF NANTUCKET
Tracy Curley, Town Biologist
34 Washington Street
Nantucket, MA 02554

November 24, 2003

Nantucket Conservation Commission
TOWN OF NANTUCKET
37 Washington Street
Nantucket, MA 02554

RE: Great Harbor Yacht Club, the proposed docks and piers at 96 Washington Street

Dear Commissioners,

I would like to request additional time to review the submitted proposal and to verify the applicants' findings. Keith Conant, Town Shellfish Biologist, will need an additional two weeks to dive the area. Another week will be used to write up the habitat assessment and make recommendations. At a glance, only eelgrass beds greater than 90% bottom coverage have been mapped. Therefore, eelgrass beds less than 90% need to be mapped as well as the disturbance zone from the proposed 76,000 square foot dredged area.

At this time, we would request the Commission continue the comment period for an additional month or after the holidays.

Sincerely,

Tracy Curley
Town Biologist

Marine and Coastal Resources Department
TOWN OF NANTUCKET
Tracy Curley, Town Biologist
34 Washington Street
Nantucket, MA 02554

January 9, 2004

Nantucket Conservation Commission
TOWN OF NANTUCKET
37 Washington Street
Nantucket, MA 02554

RE: Great Harbor Yacht Club, the proposed docks and piers at 96 Washington Street

Dear Commissioners,

I have reviewed the NOI submitted by the Great Harbor Yacht Club, Inc. dated November 2003 for the construction of a 79 or 80 slip floating dock system, relocation and reconstruction of existing marine travel lift piers, and associated dredging. The removal of the existing bulkhead, travel lift, seasonal floats, steel and timber piles; the dredging of a new channel; the construction of new travel lift; the construction of a new series of floats; and construction of a service walkway will negatively impact eelgrass beds, water quality, shellfish and finfish habitat, circulation, the salt marsh and creek ecosystem.

The following comments and concerns are based on the review of the Notice of Intent and attachments dated November 19, 2003 as submitted to the Conservation Commission.

1. Sediments: Concerns related to proposed dredging
There are three identified heavy metals (arsenic, lead, mercury) present in the sediment samples. The concentrations of the three metals appear to decrease in concentration as you move away from the shipyard. Arsenic has been dispersed the greatest distance from the shipyard reaching sediment sample site 11 (Sheet 2 of 4).

Due to the applicants' chosen methodology and data presentation, it is not clear where the sediment samples were taken in relation to eelgrass beds. Composite samples were used for sediment analysis making it difficult to differentiate between results found in areas of eelgrass versus sand.

Disturbance of sediments through dredging, jetting, and destruction of eelgrass may increase concentrations of arsenic, lead and mercury into the water column. Fish and shellfish can accumulate arsenic. Most of the arsenic found in seafood is methylated and

relatively low in toxicity (USFDA, Guidance Document for Arsenic in Shellfish 2003). Although the arsenic in fish is mostly in a form not harmful, exposure to high levels of some organic arsenic compounds may cause similar affects as inorganic arsenic (Agency for Toxic Substances and Disease Registry, 2003). Arsenic was found in quantities ranging from 1.5 mg/kg to 4.8 mg/kg.

Lead accumulates in the bodies of water organisms and soil organisms. Lead negatively impacts phytoplankton and shellfish. Since lead and mercury bioaccumulate in the food chain, resuspension of these heavy metals would be detrimental to the quality of shellfish and finfish in adjacent areas.

Sediments were tested for total organic carbon. All samples had high organics. The lowest total organic carbon was found in samples taken in what appeared to be eelgrass. Eelgrass roots and leaves absorb elements such as inorganic carbon, nitrogen, and phosphorus. Disturbance of these sediments via dredging and jetting would result in a high oxygen demand as disturbance of carbon rich sediments deplete dissolved oxygen in the water column.

Sediments were tested for grain size. The sediment around the shipyard contains fine silt and clay. Resuspension of this sediment will be detrimental to eelgrass beds and potentially to the adjacent salt marsh and creek ecosystem.

The methodology of dredging with a clamshell bucket will increase turbidity and sedimentation in the marine resource. The clamshell bucket would suspend sediment and suffocate eelgrass to the east and north of the shipyard. Due to the fine silt and clay sediments, dewatering and disposal of sediments should be carefully determined. Dewatering on site, if permitted, should utilize best available technologies and require daily monitoring and active onsite supervision by qualified personnel. On land disposal should be carefully evaluated as not to allow possible transport into any marine waters at any time. Beach nourishment may increase the filling effect during high winds and heavy seas in the resource area.

2. Eelgrass: Impact Concerns

The applicant has stated that changes to the bottom topography has been kept to a minimum. The applicant has further stated, “the minor change in the cross sectional area of the channel will not have significant negative impacts of wave height, flooding, erosion, or sediment transport”. Dredging a new channel through an eelgrass bed negatively impacts the resource area. Destruction of eelgrass increases erosion, sediment transport and is detrimental to shellfish, finfish and bay scallop habitat.

As proposed, this project will destroy all the eelgrass at the site. The majority of proposed pier and floats would displace viable and healthy eelgrass. ENSR’s conclusions that “since the proposed floats are expected to be placed along the edge of the channel, the effect on the eelgrass population is expected to be minimal” is not supported by field inspection. Placement of any piers or floats in eelgrass will fragment, shade, and kill an

eelgrass bed. ENSR acknowledges that, "any boating activity around the eelgrass will likely have a negative impact on eelgrass".

Eelgrass presence is an indication of good water quality, circulation and light availability. Replacing eelgrass or transplanting eelgrass in another area of the harbor will not mitigate the natural habitat that will be lost. In fact, eelgrass transplanting or planting studies conducted by Save the Bay Narragansett, RI has been proven to have a very low success rate. The circulation of the harbor, location of adult brood stock, and water temperature depicts where bay scallops larvae will eventually settle and attach to blades of eelgrass. Changing eelgrass placement will not mitigate a shellfish or finfish spawning sanctuary.

Eelgrass is an integral part of the marine ecosystem. Eelgrass has many functions: stabilizes sediment, provides canopy structure, primary producer of oxygen, a nutrient and contaminant filter, acts as habitat refuge, improves water quality, provides epibenthic and benthic production. Eelgrass is widely recognized for its role as a breeding ground and nursery for bay scallops and winter flounder populations. Eelgrass is an important component of nutrient recycling and the detritus cycle.

Destruction of eelgrass habitat by propeller wash, shading and dredging alters water chemistry. Disturbing sediments can resuspend nutrients into the water column making nutrients available for uptake by primary producers. Algal mats can form as a result of nutrient suspension and smother shellfish. Excessive algal growth decreases water clarity, increases nutrient loading and facilitates fecal coliform growth. Destruction of eelgrass results in lower dissolved oxygen levels in the water column, increased turbidity, decreases species diversity. Dredging will physically remove eelgrass blades and smother adjacent eelgrass beds via sediment transport.

The proposed pier and float system is in an area of 5% to 95% eelgrass coverage. Docks and piers inhibit natural light from reaching eelgrass blades, which destroys the eelgrass bed. Eelgrass beds are reduced by 50% when light levels are decreased to 30% by docks and piers (Burdick and Short, The Effects of Boat Docks on Eelgrass Beds in Coastal Water in Massachusetts, 1998). The proposed South East Walkway would have to be a fixed pier more than 13.5 ft high to permit at least 30% light to reach the bottom. At this height only a predicted 50% of eelgrass production could take place. To permit 50% of light to reach the eelgrass, the dock should be at least 20ft high.

Eelgrass is most negatively impacted by floating docks that block light and fragment eelgrass beds. Eelgrass is impacted directly under and adjacent to docks as depicted by depressed shoot density and canopy structure (Burdick and Short, 1998). Loss of eelgrass habitat will directly reduce bay scallop and winter flounder production.

3. Shellfish:
Bay scallops, oysters, and quahogs are present in the proposed dredge area. Razor clams were found in the July 2001 shellfish survey conducted by the Marine and Coastal Resources Department for Grey Lady Marine in the area where the "Outlet w/ Butterfly

Valve" is located on the Eelgrass Survey Great Harbor Yacht Club, Figure 2. The area where the razor clams are located is in the proposed dredge footprint.

Although the proposed project is located in a designated "closed area to shellfishing", it remains an important shellfish spawning sanctuary. Bay scallops are excluded from state shellfish closure as only the abductor muscle is marketed. Bay scallops are presently harvested commercially and recreationally in and near the proposed pier location. Alteration of water quality and direct removal of eelgrass will adversely impact bay scallop, quahog, winter flounder habitat and productivity.

4. Water quality:
This project will adversely affect water quality by increasing contaminants into the water column. The placement of the fuel service at the end of the floating dock is the worst possible location. The fueling station is proposed in an area that currently contains over 95% eelgrass and where an accidental spill can be carried quickly to Monomoy Beach, the Creeks, and salt marsh. Any breaks in the fuel line will discharge directly into the salt marsh and creeks as well as disperse over healthy eelgrass beds. Any over filling of vessel tanks including nozzle drip and or spillage will also discharge into water column and potentially serve as a greater cumulative impact threat to healthy eelgrass beds.

The loss of the eelgrass bed will have a detrimental affect on water quality. Loss of eelgrass decreases dissolved oxygen in the water column. Loss of eelgrass increases sediment transport, changes water chemistry, and adversely impacts shellfish, scallop and fish habitat. Increased nutrient suspension and fresh water runoff from the structure could change phytoplankton communities from diatoms to dinoflagellates. A shift in these populations during the spring and summer, will negatively affect shellfish resources. Diatoms are the number one food source for the bay scallop. Food consumption is important prior and during scallop spawning events. Shifts in phytoplankton species may adversely affect the food supply for juvenile winter flounder residing in the area.

Increased boat activity will likely decrease water quality by resuspending bottom sediments and serving as a source for hydrocarbon product contamination. Lead, mercury, and arsenic in the bottom sediment are of concern. The resuspension of contaminated sediment changes oxygen demands and makes contaminants available for uptake by organisms in the water column.

5. Circulation: Impacts
Placement of pilings, floating docks, and associated boats will alter the cross sectional flow of water in the southeast corner of the lower harbor. The floats and associated boats will act as a dam or wall within the water column during all tide stages. The outgoing tide from the harbor contains the greatest amount of nutrients. On an outgoing tide, the water will be bottled in the southeast corner near the creeks and salt marsh adversely affecting the health of the ecosystem by nutrient loading.

Reduction of flow and increased nutrient loading will cause *Polysiphonia* to proliferate as well as other epiphytic species to grow in this area. Epiphytic algae smother shellfish beds and eelgrass. The resuspension of fine silts and clays in addition to reduced water circulation will smother eelgrass. The resultant alteration of water circulation within the harbor may cause sediment accumulation within the channels of the marsh creek ecosystem. Reduction or elimination of tidal flushing within the creeks would result in the destruction of the salt marsh. Any alterations to the salt marsh would have negative impacts to flood control.

Changes in circulation patterns will also change where the bay scallop larvae will settle. Larval scallops are in suspension for 14 days before they settle onto substrate. If the circulation in this area is altered, the reproductive dispersal capabilities of scallops, quahogs, and oysters will be reduced.

6. Finfish: Impact Concerns
The presence of juvenile winter flounder indicates this area as being important to the life stage of fish. Juveniles are generally found in water depths from 3 to 30 feet with water temperatures below 75 degrees Fahrenheit. Nantucket Harbor is considered Essential Fish Habitat for winter flounder based on NOAA Estuarine Living Marine Resource and the MCRD 2001 Shellfish Survey. Any alteration of water quality due to dredging, shading, or construction and use of float facilities will adversely impact finfish habitat.

7. Lights: Impacts
Lights shining into the water column will adversely affect flora and fauna in their habitats.

8. Conservation Commission Wetland Protection Regulations:
According to the Town of Nantucket Conservation Commission Wetland Protection Regulations adopted February 1988, the Great Harbor Yacht Club project as proposed does not meet the following performance standards/regulations:

2.01 Land Under the Ocean, section B, no. 3 and 7.
2.02 Coastal Beaches and Tidal Flats, section B, no. 3.
2.06 Salt marshes, section B., no. 3.
2.08 Land Containing Shellfish, section B, no. 3 and 6.
2.09 Anadromous/Catadromous Fish Runs, Banks Along Fish Runs, and Lands Under Fish Runs, section B, no. 2.
2.10 Land Subject to Coastal Storm Flowage, section B, no. 1.

Summary:
Dredging as proposed will commence a chain reaction of sediment transport as well as change the benthic community. The initial dredging will put the sediment in suspension. The sediment will be subject to tidal movements. The increased boat traffic in this area will provide the energy to keep the sediment in suspension. Increased turbidity will block the light needed for eelgrass production. Siltation will smother shellfish beds. The oxygen production/respiration will shift and change the benthic community. More

dissolved oxygen will be consumed as eelgrass is destroyed. The predator and prey relationship will shift until a new equilibrium is established. Pockets of anoxia will be created and the chemistry of water changed.

It is my professional opinion, based on the analysis outlined above, that the project as presently proposed would be harmful to and significantly alter the existing biotic communities within and adjacent to the project area resulting in an unacceptable degradation to water quality, plant and animal habitat and biodiversity.

Sincerely,

Tracy Curley
Town Biologist

Marine and Coastal Resources Department
TOWN OF NANTUCKET
Keith Conant, Shellfish Biologist
34 Washington Street
Nantucket, MA 02554

January 9, 2004

Nantucket Conservation Commission
TOWN OF NANTUCKET
37 Washington Street
Nantucket, MA 02554

RE: Great Harbor Yacht Club, the proposed docks and piers at 96 Washington Street

Dear Commissioners,

Five dives were conducted to verify data submitted by ENSR on the applicants' behalf. After careful review of ENSR's findings, I believe that the eelgrass concentrations have been underestimated. I found eelgrass in areas where ENSR's figures depicts voids. Although sparse in density, eelgrass was found in the channel at the eight-foot contour. ENSR neglected to survey an area where the applicant had proposed dredging to the north of the project. This area contained greater than 50% eelgrass. In the summary of findings, ENSR reports that eelgrass can appear one year and not the next. The nature of eelgrass is not that dynamic unless physically manipulated through dredging, scouring or changes in water quality. If eelgrass is present, the area is productive and will support finfish and shellfish. Eelgrass presence characterizes a healthy ecosystem.

ENSR has stated that the two floats would be placed along the channel, which was completely devoid of eelgrass. Four of my dive surveys were conducted under the proposed floating pier locations. I found eelgrass to be present in the areas where the floats are proposed. The eelgrass survey provided by ENSR shows 5 – 95% eelgrass coverage in the proposed float locations.

The first eelgrass survey was conducted on December 9, 2003. This survey was conducted as a general reconnaissance study. During the initial survey I was accompanied by Ned Clafflin, a student of the College of the Atlantic, working on his master thesis (impacts to eelgrass habitat). We determined that the survey results reported by ENSR underestimated eelgrass percentages within the project site area as existed on 12/9/03.

Follow up dives were conducted on 12/15/03, 12/23/03, 1/6/04, 1/7/04. To cover the proposed pier locations, I divided the survey area into four sections (refer to Attachment A). Due to the length of the southeast pier, three dives were required. The second dive

survey covered the southern pier from 0ft to 120ft. The third dive was the continuation of the southeast pier from 120ft to 280ft. The fourth dive was the remaining section of the southeast pier area.
Field inspection data was logged as follows:

Great Harbor Yacht Club Southern Pier

Dive Survey conducted on December 15, 2003 at 9:30 am to 11:20am. The entire area was covered with corrosive debris. An electric cable was observed running from bulkhead in an easterly direction into harbor.

0-10ft: sand bottom, dead shell
10-20ft: sand bottom, dead shell
20-30ft: sand bottom, dead shell
30-40ft: sand bottom, dead shell, 1 quahog, 1 scallop
40-50ft: sand, dead shell, 1 scallop
50-60ft: sand, dead shell, sunken debris
60-70ft: sand, dead shell, gravel, 5% *Codium fragile* attached to rocks, 5% *Polysiphonia denutata*, large crab cage, 1 scallop, 1 spider crab
70-80ft: sand, dead shell, gravel, 5% *Codium fragile* attached to rocks, 5% *Polysiphonia denutata*, 1 quahog, 1 scallop, abandoned mooring
80-90ft: sand, dead shell, gravel, 5% *Codium fragile* attached to rocks, 5% *Polysiphonia denutata*, 2 scallops
90-100ft: sand, dead shell, gravel, 5% *Codium fragile* attached to rocks, 5% *Polysiphonia denutata*, 3 scallops, 1 quahog
100-110ft: sand, dead shell, gravel, 5% *Codium fragile* attached to rocks, 5% *Polysiphonia denutata*, 1% whip weed (*Acrothrix novae-angliae*), 4 scallops
110-120ft: sand, shell, gravel, *Codium fragile* attached to rocks, 5% *Polysiphonia denutata*, 1% *Enteromorpha intestinalis*, 1% eelgrass (*Zostera*), 3 scallops, 1 quahog, 1 conch

The third dive survey was conducted on December 23, 2003. This dive survey was the continuation to dive 2 beneath the proposed southeast pier from 120ft to 280ft. Marine battery was observed.

120-130ft: 1% eelgrass
130-140ft: 1% eelgrass
140-150ft: 1% eelgrass
150-160ft: 2% eelgrass, 1 scallop
160-170ft: 2% eelgrass, codium
170-180ft: 5% eelgrass, 2 scallops
180-190ft: 10% eelgrass
190-200ft: 15% eelgrass, 1 scallop
200-210ft: 15% eelgrass, codium
210-220ft: 15% eelgrass
220-230ft: 20% eelgrass

230-240ft: 20% eelgrass, 2 scallops
240-250ft: 25% eelgrass, 1 scallop
250-260ft: 20% eelgrass
260-270ft: 20% eelgrass
270-280ft: 25% eelgrass, 2 scallops

Dive 4, continuation of southeast proposed pier on January 6, 2004. I removed the marine battery along with other debris.

280-290ft: 30% eelgrass
290-300ft: 30% eelgrass, 1 scallop
300-310ft: 25% eelgrass
310-320ft: 20% eelgrass
320-330ft: 25% eelgrass, 2 scallops
330-340ft: 30% eelgrass
340-350ft: 35% eelgrass
350-360ft: 40% eelgrass
360-370ft: 45% eelgrass, 2 scallops
370-380ft: 60% eelgrass
380-390ft: 65% eelgrass
390-400ft: 80% eelgrass, 3 scallops
400-410ft: 90% eelgrass
410-420ft: 80% eelgrass, 1 scallop
420-430ft: 90% eelgrass, 2 scallops
430-440ft: 80% eelgrass, 1 spider crab
440-450ft: 90% eelgrass, 3 scallops, 1 spider crab
450-460ft: 95% eelgrass, 4 scallops
460-470ft: 80% eelgrass, 1% whip weed, 2 scallops
470-480ft: 90% eelgrass, 1 scallop

Turn to the east from the southeast pier.

480-490ft: 85% eelgrass
490-500ft: 80% eelgrass
500-510ft: 70% eelgrass, 2 scallops
510-520ft: 60% eelgrass
520-530ft: 40% eelgrass

Great Harbor Yacht Club Northwest Pier.

Dive 5, January 7, 2004 surveying the northwest pier.

0-10ft: 0% eelgrass
10-20ft: 0% eelgrass
20-30ft: 0% eelgrass
30-40ft: 0% eelgrass

40-50ft: 0% eelgrass
50-60ft: 0% eelgrass, 1 scallop
60-70ft: 1 % eelgrass
70-80ft: 1% eelgrass
80-90ft: 1% eelgrass
90-100ft: 1% eelgrass, 1 scallop
100-110ft: 1% eelgrass
110-120ft: 5% eelgrass, codium
120-130ft: 5% eelgrass, wooden plank at angle of 60 degrees east,
130-140ft: 5% eelgrass, railroad tie at 60 degrees angle east
140-150ft: 1% eelgrass, block covered with codium
150-160ft: 20% eelgrass, 3 scallops
160-170ft: 15% eelgrass
170-180ft: 20% eelgrass, 1 scallop
180-190ft: 15% eelgrass, polysiphonia, 1 scallop
190-200ft: 25% eelgrass, codium, 1 quahog
200-210ft: 20% eelgrass, codium, polysiphonia
210-220ft: 20% eelgrass, codium, polysiphonia
220-230ft: 20% eelgrass, codium, polysiphonia
230-240ft: 20% eelgrass, codium, polysiphonia, 1 scallop
240-250ft: 30% eelgrass, 4 scallops, 1 spider crab, (railroad tie ends)
250-260ft: 35% eelgrass, codium, 2 scallops, 1 quahog, 2 spider crabs
260-270ft: 40% eelgrass, 1 scallop
270-280ft: 45% eelgrass, 2 scallops, 1 spider crab
280-290ft: 80% eelgrass, 4 scallops, 1 spider crab
290-300ft: 80% eelgrass, codium, polysiphonia, 3 scallops
300-310ft: 95% eelgrass, 1 scallop
310-320ft: 95% eelgrass, 2 scallops

Eelgrass was found in the channel from 5% to 20% beyond the first channel marker moving away from shipyard. Eelgrass was found outside applicants survey area to the west in the mooring fields in concentrations of 75% to 95% and to the east 95% to 50% tapering off in the shallow flats.

Conclusions:
Direct field examination of land under the ocean and land containing shellfish have documented significant and important shellfish, finfish, scallop, and eelgrass populations and habitat. Data collected in 12/03 of existing conditions show even greater occurrences and densities of eelgrass beds and shellfish populations that determined by earlier surveys provided by the project proponent. File information regarding juvenile winter flounder populations document the project area to be important to the life cycle and to serve as a spawning ground for winter flounder.

Construction and use of the marina facilities as proposed, including the accompanied dredging, will alter existing water circulation patterns based on direct observation of

existing conditions, will directly impact (by removal, by sediment and by water quality degradation) eelgrass beds, shellfish, finfish, and scallop populations and habitat, and will indirectly result in the loss of healthy salt marsh.

It is my professional opinion based on direct field inspection and the information provided above that the project as proposed would serve to permanently damage the biotic health and productivity of an existing healthy estuarine system that is critical to the island of Nantucket.

Sincerely,

Keith Conant
Shellfish Biologist

Marine and Coastal Resources Department
TOWN OF NANTUCKET
Tracy Curley, Town Biologist
34 Washington Street
Nantucket, MA 02554

January 9, 2004

Nantucket Conservation Commission
TOWN OF NANTUCKET
37 Washington Street
Nantucket, MA 02554

RE: Great Harbor Yacht Club, the proposed docks and piers at 96 Washington Street

Dear Commissioners,

Three sediment samples were collected for the analysis of mercury, lead, arsenic, and zinc at the proposed Yacht Club location on January 7, 2004. Those samples have been sent to Envirotech Laboratories for analysis. The results of these samples will be submitted to the Conservation Commission upon receipt.

Sincerely,

Tracy Curley
Town Biologist